HOW TO...
Get more from Excel's functions

Once you understand how Excel's functions work and how to use them, you will find you get much more from the program, as Rod Lawton explains

Many people use Excel like a giant calculator. This may get the job done, but you'll be missing out on a lot of what it can do. Excel isn't just about totalling up figures. It can be used to analyse data and carry out a range of complex mathematical and statistical calculations that would otherwise be too time-consuming to attempt.

To use Excel in this way, however, you will need to get to grips with functions. Although you may think this is the province of programmers, a lot of these functions are really quite easy to understand. Functions are able to carry out tasks and analyses involving a level of maths most of us just don't have. In some cases, the functions do not have mathematical equivalents. Using functions, Excel is able to work like a database, looking up data automatically from lists. It is even programmable, with logical functions that can produce different outcomes depending on the data.

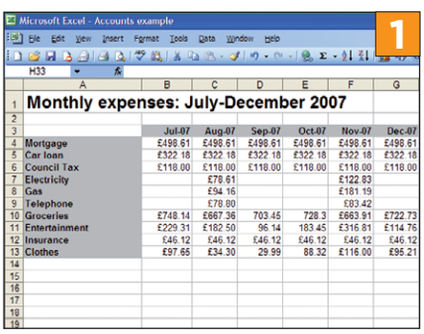
In this walkthrough, we'll introduce functions to those who haven't used them before, or those who need a refresher. We'll look at a common function (so common, in fact, that you may not realise it is a function) and dissect it to see how it works. Next month, we will be looking at some more advanced functions, and how these could open your eyes to the ways in which Excel can be used.

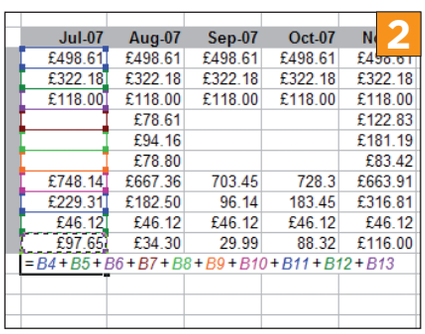
1 A typical use for a spreadsheet is keeping track of the household accounts. This is a good example because it illustrates one of the most common functions of all, and it helps to explain functions in general. The worksheet that is shown in the screenshot for this step is organised in a straightforward fashion, with items of expenditure, such as mortgage and bills, arranged in rows and each month arranged as a column. If you would like to follow the tutorial exactly as shown, you will find a copy of this worksheet (called Functions Tutorial.xls) on this month's cover disc.

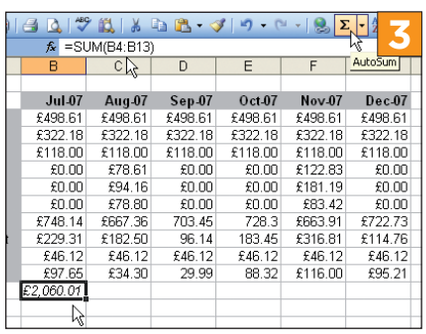
2 The raw data is in place, but it doesn't tell us very much. For a start, it would be good to know how much has been spent in total each month. This can be worked out without the help of any functions, although it is rather long-winded. In cell B14, below the column of figures, type the '=' symbol without the quotation marks. This indicates to Excel that you are entering a formula. Then click on the first data cell in the column, which is B4, and press the '+' key. Click on the next cell in the column, and so on, until all the cells are added together. Unfortunately, while this does work, it is not very fast and it's easy to make mistakes.

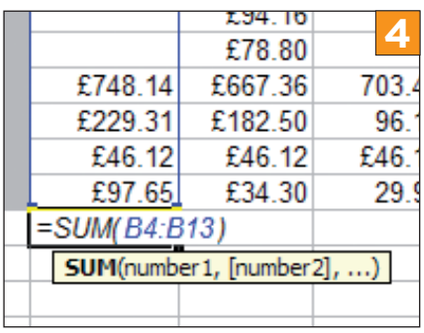
3 Excel has an AutoSum button on the toolbar. To use this, you will need to highlight the column of figures including the blank cell at the bottom, which is B14. Press the AutoSum button on the toolbar at the top of the screen. The column total is calculated and inserted automatically (we've set the style to italic to distinguish the total from the data). The formula bar at the top shows the formula that has been used: this is =SUM(B4:B13). The AutoSum button is inserting Excel's SUM function together with the cell range it is being asked to add up.

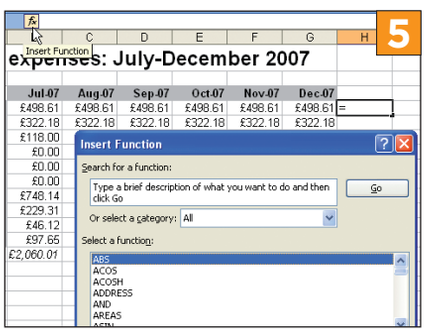
4 This is a good starting point for examining the anatomy of a function. You can double-click the cell containing the total to see the function in situ. Here it's colour-coded, which makes it easier to decipher. First there's the = sign, which comes before all calculations. Next is the name of the function, SUM. After this there is a pair of brackets containing the function's arguments. This sounds technical, but the principle is quite simple. The function is what

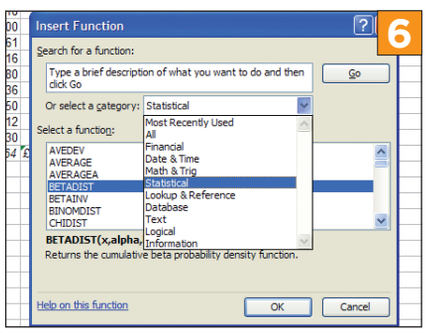












you want to do, and the argument is the data you want to use. The argument for our SUM function is the cell range B4 to B13, which is displayed here in blue as B4:B13. This means that the formula is going to add cells B4 to B13. All functions follow this same basic layout. However, different arguments will be used, depending on what the function does.

5 We know how much has been spent in total each month, but it would also be nice to find out exactly how much has been spent, on average, in each category over the six-month period. This too could be done the long way, by totalling up the row (mortgage payments, for example) and then dividing by six (the number of months). However, it is easier to use a function designed for the job. To find and use a suitable function, first click in the cell where you want the function to go (cell H4 in our example). Then click on the fx button on the formula bar. This displays the Insert Function dialog box.

6 Excel's many functions are divided into categories, making it easier for you to pinpoint those you need. To select a category, use the 'Or select a category' pop-up menu. The function we need is in the Statistical section.

7 The Insert Function dialog box displays a scrollable list of the functions in this category. To find out what a function does, click on it and study the example and the description below. The AVERAGE function is the one we want, and the description shows that it can have more than one argument.

Arguments are separated by commas. In this instance, we see the arguments can be number1, number2 and, as indicated by the ellipsis (the three dots), possibly more. The explanation underneath isn't exactly beginner-friendly, but it's basically saying that number1, number2 and so on can be numbers that you type directly into the function, arrays (cell ranges) or references (single cells). In this instance, we'll be using a row of numbers as our argument, which is an array.

The 'Help on this function' link at the bottom takes you to online examples, which can make the functions easier to understand.

Next, we'll look at how the AVERAGE function works. Hopefully, this will make things clearer. Click OK.

8 The function is inserted into the cell and we now have to identify its arguments. In fact, though, Excel has already done this for us. Just as the AutoSum button usually identifies the column of figures you want to total automatically, here the AVERAGE function has correctly identified that we want to obtain an average value for the numbers in that row (Excel automatically looks for contiguous data ranges). If you click OK, the function will be inserted and an average figure calculated.

There are a couple of other features worth explaining, and these will be covered in the next two steps. These aren't absolutely necessary for our example, but they do show how to select cell ranges manually and why the AVERAGE function dialog box has extra arguments (number2 and so on).

9 You can't always rely on Excel automatically identifying the cells for the function argument. They may be in another location on the worksheet or, as with AutoSum, Excel may not select data on either side of a blank cell. To make your own selection, with the argument highlighted in the Function Arguments dialog, click and drag the cursor to select the correct cell range. Sometimes the Function Arguments dialog box obscures the area of the worksheet you need to use. In this case, click the button immediately to the right of the argument field; this collapses the dialog box to a single line. Select the cell range and click the button again to expand the dialog box.

10 Next we need to look at the AVERAGE function's extra arguments fields. Each function requires different kinds of data, depending on what it's designed to do. The AVERAGE function can average just a single range of cells, but you can also add other cell ranges if you like. We've selected the second argument field and chosen a cell range for that, too. The Insert Function dialog box adds another blank field in case we need to insert a third, and if we used that field then another blank field would appear, and so on.

The extra arguments for the AVERAGE function are optional. In a well-planned worksheet it is unlikely that you'll need to use these, but they are there if you want them. Not all functions are so free and easy. In most cases, each argument is essential to the correct operation of the function. We'll be seeing examples of this in next month's walkthrough.

11 You now have the finished worksheet, with averages calculated for each row and displayed in the highlighted column to the right. There's just one more thing to bear in mind with the AVERAGE function. By default, it averages only those cells that contain data. So with the quarterly gas, electricity and phone bills, it ignored the months where no payments were made and simply calculated an average bill size. For example, the average for the electricity (H7) is £100.72. This information is useful, but you may want to know the average cost per month, not just the average bill size. To find this out, rather than leaving a cell blank, you will have to enter a '0' for each month where no payment was made.

12 When you have entered '0' in all the necessary cells, the totals in the Average column change. The AVERAGE function is forced to include months where the bill was '0' in its calculation. The average in cell H7 is now £33.57 – the average for each month in our six-month period. This tip is specific to the AVERAGE function, but it demonstrates a general point. Each function has its own ways of working. Although the basic structure is the same, it's important to become familiar with the uses and quirks of each function that you want to use.

